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**MARKED VERSION OF CLAIMS WITH PRESENT STATUS DELINEATED**

1. **(Currently Amended)** A process for preparing a catalyst composite useful for alkylaromatic conversion, the said process comprising
  - a) contacting an intermediate pore metallosilicate with an organosilicon compound in a solvent for a specific duration and then recovering the solvent
  - b) combining the organosilicon compound treated metallosilicate with water and then drying the catalyst
  - c) repeating the steps a) and b) above
  - d) calcining the catalyst in an oxygen containing atmosphere sufficient to remove the organic material and deposit siliceous matter on the metallosilicate.

wherein in said process calcining step d) is not repeated after each of step a) + b).
2. **(Original)** A process as claimed in claim 1 wherein said organosilicon compound is water insoluble.
3. **(Original)** A process as claimed in claim 2 wherein the said organosilicon compound is tetraalkoxy silane.
4. **(Original)** A process as claimed in claim 3 wherein the said tetraalkoxy silane is tetraethoxy silane.
5. **(Original)** A process as claimed in claim 1 wherein the said solvent is selected from lower aliphatic alcohols, C<sub>5</sub>-C<sub>10</sub> saturated linear or cyclic hydrocarbons, C<sub>6</sub>-C<sub>8</sub> aromatics or mixture thereof.
6. **(Original)** A process as claimed in claim 5 wherein the said solvent is a mixture of toluene and methanol.
7. **(Original)** A process as claimed in claim 1 wherein the concentration of the organosilicon compound in said solvent is in the range of 1 to 25 percent by weight.
8. **(Original)** A process as claimed in claim 1 wherein the said metallosilicate is treated with the organosilicon compound containing solution for 0.5 to 24 hours.
9. **(Original)** A process as claimed in claim 1 wherein the said solvent is recovered

after metallosilicate is treated with the organosilicon compound containing solution.

10. **(Previously Presented)** A process as claimed in claim 1 wherein amount of said water is in the range of from 1 to 200 percent of the mass of the metallosilicate.

11. **(Currently Amended)** A process as claimed in claim 1 wherein the said water combined metallosilicate composite is dried at a temperature of from 10 to 150°C.

12. **(Original)** A process as claimed in claim 1 wherein the said water combined metallosilicate composite is dried at a temperature of 50 to 150°C.

13. **(Original)** A process as claimed in claim 11 wherein the said water combined metallosilicate composite is dried at a temperature of from 80 to 130°C.

14. **(Previously Presented)** A process as claimed in claim 11 wherein the said wet metallosilicate composite is dried for from 1 to 20 hours.

15. **(Original)** A process as claimed in claim 1 wherein the step a) and step b) are repeated more than once.

16. **(Original)** A process as claimed in claim 1 wherein the solvent recovered is reused.

17. **(Original)** A process as claimed claim 1 wherein the said calcination is carried out at a temperature in the range of from 160 to 800°C.

18. **(Original)** A process as claimed claim 17 wherein the said calcination is carried out at a temperature in the range of from 300 to 600°C.

19. **(Original)** A process as claimed claim 17 wherein the said calcination is carried out at a temperature in the range of from 400 to 550°C.

20. **(Cancelled)**

21. **(Currently Amended)** A process for preparing a catalyst composite useful for alkylaromatic conversion, the said process comprising

- a) contacting an intermediate pore metallosilicate with a water insoluble organosilicon compound in a solvent and then recovering the solvent
- b) combining the organosilicon compound treated metallosilicate with water, the amount of water employed being in the range of from 1 to 200 percent of the mass of said metallosilicate,
- c) drying the product from step b) at a temperature in the range of 10 to

150°C;

- d) repeating the steps a), ~~and b)~~ and c) above
- e) calcining the product in an oxygen containing atmosphere at a temperature in the range of 160 to 800°C sufficient to remove the organic material and deposit siliceous matter on the metallosilicate.

wherein in said process calcining step e) is not repeated after each of step a) + b) + c).

22. **(Currently Amended)** A process for preparing a catalyst composite said process comprising

- a) contacting an intermediate pore metallosilicate with an organosilicon compound in a solvent for a specific duration and then recovering the solvent
- b) drying the catalyst
- c) repeating the steps a) and b) above
- d) calcining the catalyst in an oxygen containing atmosphere sufficient to remove the organic material and deposit siliceous matter on the metallosilicate.

wherein in said process calcining step d) is not repeated after each of step a) + b).

23. **(Original)** A process as claimed in claim 22, wherein said organosilicon compound used is water soluble.

24. **(Currently Amended)** A process ~~as claimed in claim 22~~ for preparing a catalyst composite said process comprising

- a) contacting an intermediate pore metallosilicate with an organosilicon compound in a solvent for a specific duration and then recovering the solvent
- b) drying the catalyst
- c) repeating the steps a) and b) above
- d) calcining the catalyst in an oxygen containing atmosphere sufficient to remove the organic material and deposit siliceous matter on the metallosilicate;

wherein the said organosilicon compound is aminoalkyl trialkylsilane

25. **(Currently Amended)** A process ~~as claimed in claim 24~~ for preparing a catalyst composite said process comprising
- a) contacting an intermediate pore metallosilicate with an organosilicon compound in a solvent for a specific duration and then recovering the solvent
  - b) drying the catalyst
  - c) repeating the steps a) and b) above
  - d) calcining the catalyst in an oxygen containing atmosphere sufficient to remove the organic material and deposit siliceous matter on the metallosilicate;

wherein the said ~~aminoalkyl trialkylsilane~~ organosilicon compound is 3-aminopropyl triethoxysilane.

26. **(Original)** process as claimed in claim 22 wherein the said solvent is selected from lower aliphatic alcohols, C<sub>5</sub>-C<sub>10</sub> saturated linear or cyclic hydrocarbons, C<sub>6</sub>-C<sub>8</sub> aromatics or mixture thereof and water.
27. **(Original)** process as claimed in claim 22 wherein the said solvent is water.
28. **(Previously Presented)** process as claimed in claim 22 wherein the concentration of the organosilicon compound in said solvent is in the range of 1 to 99% by weight.
29. **(Original)** A process as claimed in claim 22 wherein the said metallosilicate is treated with the organosilicon compound containing solution for 0.5 to 24 hours.
30. **(Original)** A process as claimed in claim 22 wherein the said solvent is recovered after metallosilicate is treated with the organosilicon compound containing solution.
31. **(Original)** A process as claimed claim 22 wherein the said organosilicon compound treated metallosilicate composite is dried at a temperature form 10 to 150°C.
32. **(Original)** A process as claimed in claim 22 wherein said water treated metallosilicate composite is dried for at least 1 hour.
33. **(Original)** A process as claimed in claim 22 wherein the step a) and step b) are repeated at least once.
34. **(Original)** A process as claimed in claim 22 wherein the solvent recovered from

the silanation step is reused for further silanation.

35. **(Currently Amended)** A process as claimed in claim 22 wherein the said calcination in said oxygen containing atmosphere is carried out at a temperature in the range 160 to 800°C.

36. **(Previously Presented)** A process as claimed in claim 22 wherein the said metallosilicate comprises a member of the pentasil family.

37. **(Currently Amended)** A process ~~as claimed in claim 36~~ for preparing a catalyst composite useful for alkylaromatic conversion, the said process comprising

- a) contacting an intermediate pore metallosilicate with an organosilicon compound in a solvent for a specific duration and then recovering the solvent
- b) combining the organosilicon compound treated metallosilicate with water and then drying the catalyst
- c) repeating the steps a) and b) above
- d) calcining the catalyst in an oxygen containing atmosphere sufficient to remove the organic material and deposit siliceous matter on the metallosilicate;

wherein the metallosilicate comprises a member of the pentasil family selected from the group consisting of: Ga-ZSM-5, Fe-ZSM-5, B-ZSM-5, Ga-Al-ZSM-5, Fe-Al-ZSM-5, B-Al-ZSM-5.

38. **(Original)** A process as claimed in claim ~~36~~37 wherein said metallosilicate is Ga-Al-ZSM-5 having silicon to aluminium ratio in the range of 150 to 600 and silicon to gallium ratio is in the range of 500 to 2000.

39. **(Original)** A process ~~as claimed in claim 37~~ for preparing a catalyst composite useful for alkylaromatic conversion, the said process comprising

- a) contacting an intermediate pore metallosilicate with an organosilicon compound in a solvent for a specific duration and then recovering the solvent
- b) combining the organosilicon compound treated metallosilicate with water and then drying the catalyst

- c) repeating the steps a) and b) above
- d) calcining the catalyst in an oxygen containing atmosphere sufficient to remove the organic material and deposit siliceous matter on the metallosilicate;

wherein said metallosilicate is Ga-Al-ZSM-5 having silicon to aluminium ratio in the range of 150 to 600 and silicon to gallium ratio is in the range of 500 to 2000.

40.-49. (Withdrawn)

50. **(Currently Amended)** A process for preparing a composite comprising the said process comprising

- a) contacting an intermediate pore metallosilicate with a water soluble organosilicon compound in a solvent and then recovering the solvent
- b) drying the product from step a) at a temperature in the range of 10 to 150°C;
- c) repeating the steps a) and b) above
- d) calcining the product in an oxygen containing atmosphere at a temperature in the range of 160 to 800°C sufficient to remove the organic material and deposit siliceous matter on the metallosilicate;

wherein in said process calcining step d) is not repeated multiple times after each of steps a) + b).

51. **(Previously Presented)** A process as claimed in claim 1 wherein amount of said water is in the range of from 2 to 100% of the mass of the metallosilicate.

52. **(Previously Presented)** A process as claimed in claim 1 wherein amount of said water is in the range of from 5 to 90% of the mass of the metallosilicate.

53. **(Previously Presented)** A process as claimed in claim 22 wherein the concentration of the organosilicon compound in said solvent is in the range of 2 to 50% by weight.

54. **(Previously Presented)** A process as claimed in claim 22 wherein the concentration of the organosilicon compound in said solvent is in the range of 5 to 25% by weight.

**REMARKS ON THE OFFICE ACTION OF AUGUST 25, 2003**

**RESPONSE TO REJECTIONS**

- Rejections under 35 U.S.C. §103(a)
  - The Examiner's Position:

The Examiner has rejected claims 1 – 2, 5, 7, 9 – 19, 21 – 23, 26 – 28, 30 – 37 and 50-54 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,602,066 to Beck *et al.* (“Beck '066”) in view of *Elementary Principles of Chemical Processes* by Felder *et al.* (“Felder *Elementary Principles* Text”).

Repeating his arguments made in his December 29, 2003 office action, in respect of the claims, the Examiner finds that Beck '066 teaches all elements of the claims except for recovery of the solvent. The Examiner asserts that it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Beck '066 in light of the teachings of the Felder *Elementary Principles* Text to recover the solvent stripped from the “selectivated catalyst such as for recycle.” The Examiner asserts that one would have been motivated to do so “because of the teaching by Felder *et al.* that such a recovery/recycle is conventional and would result in a more economical process, i.e. would not continually need to supply fresh solvent to the selectivation process.”

In regard to all dependent claims referencing independent claims 1, 21 – 22 and 50, the Examiner asserts that their recitations are also obvious as being obvious modifications of the prior art.

In respect of Claims 3, 4, and 6, the Examiner rejects them under 35 U.S.C. §103(a) as being unpatentable over Beck '066 in view of the Felder *Elementary Principles* Text as applied above, and further in view of U.S. Patent No. 6,084,096 to Li *et al.* (“Li



'096"). The Examiner acknowledges with respect to these claims that Beck '066 in view of the Felder *Elementary Principles* Text, *i.e.* the "modified Beck '066", does not teach that the organosilicon compound is a tetralkoxy silane, and not tetraethoxy silane, as required by claims 3 – 4, or that the solvent is a mixture of toluene and methanol, as required by claim 6. However, the Examiner argues that Li '096 teaches that suitable selectivation agents include tetraalkoxy silanes, including tetraethoxy silane, and further teaches suitable solvents include aliphatic hydrocarbons, as well as toluene and methanol. Based on such "teaching" the Examiner asserts that "[i]t would be obvious to one having ordinary skill in the art at the time the invention was made to have further modified the method of Beck *et al.* to include the use of the selectivating agents and solvents taught by Li *et al.*

In respect of Claims 8 and 29, the Examiner rejects them under 35 U.S.C. §103(a) as being unpatentable over Beck '066 in view of the Felder *Elementary Principles* Text as applied above, and further in view of U.S. Patent No. 5,365,004 to Beck *et al.* ("Beck '004"). The Examiner acknowledges that modified Beck '066 does not teach the duration of the selectivation process as required by claims 8 and 29. However, the Examiner asserts that Beck '004 details the preparation of a silicon-selectivated ZSM-5 catalyst, and that "[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of Beck *et al.* in light of the teachings of Beck *et al.* '004" based on a motivation of having a reasonable expectation of success from the combination.

- Applicant's Response

Applicant respectfully traverses the Examiner's rejection under 35 U.S.C. §103(a) of the claim group 1 – 2, 3, 4, 5, 6, 7, 8, 9 – 19, 21 – 23, 26 – 28, 29, 30 – 37, and 50 – 54 asserting in part that the Examiner has provided inadequate motivation for the combining the references cited against the claims, and asserting that a person of ordinary skill in the art when viewing the claim as a whole would not find any of these claims obvious even in light of the combinations recited.

Claims 1, 21, 22 and 50 are the only independent claims in the claim group 1 – 2, 5, 7, 9 – 19, 21 – 23, 26 – 28, 30 – 37 and 50 which has been rejected by the Examiner under 35 U.S.C. §103(a). Applicant respectfully asserts that the Examiner's reasoning for rejecting these claims is based on a flawed understanding of the invention, and the embodiments asserted in the claims.

In determining that the only difference between the claimed subject matter of independent claims 1, 21, 22 and 50 from Beck '066 resides in the recovery of solvents, the Applicant respectfully asserts that Examiner fundamentally misconstrues the embodiments asserted. *Inter alia*, the novelty of these claimed embodiments upon avoiding multiple calcination during the multiple silanation procedure (see page 5, paragraph 5, lines 4 -6 and page 10, last paragraph, of the specification of the application). To emphasize this difference in regard to the particular embodiments of the invention presently being sought all the independent claims have been amended to recite that the applicable calcination step is not repeated after each impregnation step. The references cited by the Examiner make clear a fundamental belief by those in the prior art – that is, that calcination should occur after each impregnation (See Beck '066 at column 3, lines 65 - 67; column 4, lines 1 to 9; column 4, lines 46 to 51; column 6, lines 5 - 8; and column 6, lines 34 – 39, claims 1, 8 and 9). Respectfully, the embodiment asserted is a radical departure from the prior art belief that calcination at the end of each impregnation was essential to the silanation process. Each of the claims 1, 21 and 22 avoid multiple calcination during multiple silanation procedures. The avoidance of calcination not only improves efficiency of the silanation process, but results in avoiding effluents, saves material and energy costs, and provides higher para-selectivity in the paraxylene production process (see examples in the specification of the patent application).

Thus, Applicant respectfully asserts that independent claims 1, 21, 22 and 50 are patentable over the prior art in disclosing processes that avoid calcination after each impregnation, and that for this reason alone, irrespective of Applicant's traverse with respect to lack of motivation for combining references to teach the recovery of the

solvent, makes these claims patentable. Therefore, Applicant also asserts that all claims depending from such independent claims, that is, dependent claims 2 – 20, and 50 – 51 (depending on claim 1) and dependent claims 23 – 39 and 53 – 54 (depending on claim 22) are also patentable, as claiming something less.

As claims 3, 4, 6 and 8 which depend from claim 1, and claim 29 depends on claim 22, it is asserted that these claims, as dependent claims 2, 5, 7, 9 – 19, 23, 26 – 28, 30 – 37 and 51 – 54 (rejected under Beck '066 and the Felder *Elementary Principles* Text alone), which also depend on either claim 1, 22 or 50, are patentable in respect of their assertion that the calcination step not be repeated after each impregnation step. Therefore, Applicant respectfully requests that the 35 U.S.C. §103(a) rejection of the claim group 1 – 2, 5, 7, 9 – 19, 21 – 23, 26 – 28, 30 – 37, and 50, claim group 3 - 4 and 6, and claim group 8 and 29, be withdrawn.

- Rejections under 35 U.S.C. §102(b)/103(a)

- The Examiner's Position:

The Examiner has rejected claim 20 as being either anticipated by Beck '066 or U.S. Patent No. 6,066,770 to Wu *et al.* ("Wu '770"). The Examiner asserts that Beck '066 discloses a selectivated ZSM-5 catalyst that may be combined with silica, alumina, or silica in combination with alumina, while Wu '770 discloses a selectivated ZSM-5 catalyst which is combined with a binder such as silica-alumina. The Examiner reasons that the disclosed products in such references and the instantly claimed product are "essentially the same" but that even if differences could be shown for the product of the product-by-process claim, that the differences "would have been obvious to one of ordinary skill in the art as a routine modification of the product in the absence of a showing of unexpected results.

- Applicant's Response

While Applicant respectfully traverses the Examiner's rejection of claim 20 on the basis that the product claimed would not be obvious to one of ordinary skill in the art, Applicant asserts that the rejection is mooted by the cancellation of claim 20 without prejudice. Applicant respectfully asserts the right to seek such claim in any continuation application or the like.

- Allowable Subject Matter

- The Examiner's Position:

The Examiner has indicated that claims 24 – 25 and 38 – 39 would be allowable if rewritten to overcome the 35 U.S.C. §112, second paragraph, rejections set forth above and to include all of the limitations of the base claim and any intervening claim.

- Applicant's Response

Claims 24 – 25 and 38 – 39 have been rewritten to overcome the 35 U.S.C. §112, second paragraph, rejections as set forth above. As it is firmly believed that claim 22 from which they all ultimately depend is independently patentable, as set forth above. Applicant does not believe there is need to rewrite these dependent claims in independent form. Early allowance of these claims is requested.

CONCLUSIONS


Accordingly, it is respectfully submitted that the claims under consideration are clearly patentable over the references of record. It is submitted that the above-identified patent application is in condition for allowance. Early notification of the allowability of the pending claims is courteously solicited.

- PETITION FOR EXTENSION OF TIME AND FEES

Applicant respectfully petitions for an extension of time corresponding to one month from the shortened statutory response period. A check in the sum of \$110 is enclosed which is believed to cover the extension fee for a large entity. The Assistant Commissioner, however, is authorized to charge payment of any fees that may be required 37 C.F.R. §1.16 in connection with the paper(s) transmitted herewith, or credit any overpayment of the same, to Deposit Account No. 033975.

Date: December 24, 2003

Respectfully submitted



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